

Differences in self-reported oral health behavior between dental students and dental technology/dental hygiene students in Jordan

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Abstract: The aim of this study was to compare differences in oral health behavior between dental students and dental technology/dental hygiene students in Jordan. One hundred and five dental students and seventy-eight dental technology/dental hygiene students were recruited into this study. All subjects were recruited from the students who were receiving training at the clinics and laboratories that belong to the Faculty of Dentistry, Jordan University of Science and Technology. The Hiroshima University-Dental Behavioral Inventory (HU-DBI) was used to assess the oral health behavior of the subjects. Significant differences were found between students from different disciplines. Dental students were found to worry more about visiting their dentist, to be less aware of bleeding gums when brushing and were less bothered by the color of their gums compared with dental technology and dental hygiene (DT/DH) students ($P < 0.05$, $P < 0.001$ and $P < 0.05$, respectively). Dental students tended to be more professionally educated about brushing and to have a belief that they cannot clean their teeth well without using toothpaste ($P < 0.01$ and $P < 0.001$, respectively). Most of them did not feel they have brushed well unless they brush with strong strokes ($P < 0.05$). A logistic regression model showed that it

might be possible to distinguish dental students from DT/DH students by using three items of the HU-DBI and the level of dental education. The difference in the HU-DBI scores was not a major feature. There were significant differences in oral health attitudes/behavior between dental students and DT/DH students. The findings might reflect differences in students' training experience and education between different specialties. (J. Oral Sci. 46, 191-197, 2004)

Key words: oral health behavior; Jordanian; dental student; dental technology/dental hygiene student.

Introduction

Previous studies have shown that mass media, dental staff, and dental literature are the main source of oral health information (1,2). Attitudes towards oral health determine the condition of the oral cavity. The behavior of oral health providers and their attitudes towards their oral health could affect their capacity to deliver oral health care and thus might affect the oral health of their patients (3-5). Dental health providers need to set an example for their patients by maintaining good oral health in their own mouths. Through their undergraduate study it is logical for students in the field of dentistry to develop and modify their attitudes/behavior towards their own oral health. This in turn could affect the oral health of their patients (6).

The Japanese version of the Hiroshima University-Dental Behavioral Inventory (HU-DBI) shows good test-

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retest reliability (7,8). The English version of the HU-DBI has good test-retest reliability as well as good translated validity (9). Using this inventory, Kawamura et al. (10) found that up to the fourth year level of undergraduate study; Japanese dental students demonstrated less favorable dental behavior and attitudes than Australian dental students. In another study, Kawamura et al. (6) showed that there were considerable differences in oral health attitudes/behavior between dental hygiene students in the USA and Korea. They attributed this to differences in the students' clinical training experience.

In Jordan, knowledge and awareness concerning periodontal disease is still poor, and more dental health education is needed to improve oral health (11). In 2002, Taani showed that around 80% of Jordan adults only attended the dentist irregularly (11). In another study he showed that only 31.4% of north Jordan private school children and 15% of north Jordan public school children visited the dentist (12). In both studies he showed that around 80% of subjects only visited the dentist for emergencies and when they had pain. Hence, the aim of the present study was to clarify the oral health attitudes/behavior of dental students and dental technology/dental hygiene (DT/DH) students in Jordan using the HU-DBI.

Materials and Methods

Subjects

One hundred and eighty-three students were recruited into this study from the Faculty of Dentistry, Jordan University of Science and Technology. The Faculty of Dentistry is situated in a heavily populated city and serves many other towns and cities. The study sample consisted of 78 third and fourth year DT/DH students, and 105 fourth and fifth year dental students (Table 1). These students were selected since they were at the level at which they entered the practical and clinical environment and had direct contact with patients. The dental course is a five-year programme, and the dental technology and dental hygiene are both four-year programmes. All of these courses are conducted entirely in English.

The English version of the HU-DBI was used in this study. The inventory was administered to the subjects after they were asked to stay after their lectures if they were willing to participate in this study. All participants were provided with a full explanation of the purpose of the study and how to score the test. They were asked to answer all the items of the inventory and were told that the investigator would be available in order to answer any enquiry regarding the inventory. Each returned inventory was checked by the investigator, and the participant was

asked to score any missing response before he or she left the room.

The null hypothesis in this study was that there is no difference in oral health attitudes/behavior between students from different specialties.

Statistical analysis

Frequency tables for group comparison were processed and analysed by chi-square tests. Then a backward stepwise logistic regression was carried out on the dependent variable (course of dental education). The Wald statistic was used to test the null hypothesis that the regression coefficients were zero. The Nagelkerke R^2 statistic was used to discriminate how well the model was able to distinguish between the two groups of dentistry and DT/DH. The summate estimate of oral health behavior was calculated from the responses to the 11 items (possible range 0 - 11) (13). Group comparisons were made using two-tailed Student's *t*-tests for the HU-DBI total score. Statistical significance was based on probability values of less than 0.05. Data were analysed using the SPSS 10.0 (SPSS, Chicago, USA).

Results

Table 2 presents the percentage distribution of the students with "agree" responses to the 20 items by gender. Compared with male students, females tended to be worried about visiting their dentist ($P < 0.05$), to be more educated about professional brushing of teeth ($P < 0.01$), not to use a toothbrush with hard bristles ($P < 0.05$), and to take longer to brush their teeth ($P < 0.05$). Half of the overall subjects (semi-final and final year students of dentistry and DT/DH) reported a perception of the inevitability of having false teeth. More than half of them agreed to the statement that "It is impossible to prevent gum disease with toothbrushing alone". Most of the students worried about their bad breath and the color of their teeth. However, 47% of the students reported that they put off going to the dentist until they have toothache.

Table 3 presents the percentage distribution of the students with "agree" responses to the 20 items by course and level of dental education. The percentage of those "worrying about visiting the dentist" among dental students was much higher than that of DT/DH students ($P < 0.05$). Comparison with DT/DH students indicated that a lower percentage of the dental students had reported gum bleeding ($P < 0.001$). A lower percentage of dental students thought they were able to clean their teeth well without toothpaste ($P < 0.001$). More DT/DH students stated that they had never received toothbrushing instruction from a dental professional compared to dental students ($P < 0.01$). A

Table 1 Distribution of the students by course and level of education and their mean age

| Course and level* | Dentistry | | | Dental Technology & Dental Hygiene | | |
|-------------------|-------------------|--------------|-------|------------------------------------|--------------|-------|
| | <i>Semi-final</i> | <i>Final</i> | Total | <i>Semi-final</i> | <i>Final</i> | Total |
| Male | 48 | 7 | 55 | 14 | 23 | 37 |
| Female | 27 | 23 | 50 | 18 | 23 | 41 |
| Total | 75 | 30 | 105 | 32 | 46 | 78 |
| Age (yrs) | 22.0 | 22.6 | 22.1 | 21.6 | 21.8 | 21.7 |

* Semi-final means Grade 4 for Dentistry course and Grade 3 for Dental Technology & Dental Hygiene courses.

Final means Grade 5 for Dentistry course and Grade 4 for Dental Technology & Dental Hygiene course.

Table 2 Percentage of 'agree' responses by gender

| No. | Item descriptions | Gender | | | χ^2 value |
|-----|--|------------------|--------------------|-------|----------------|
| | | Male (n = 91) | Female (n = 92) | Total | <i>P</i> |
| 1. | I don't worry much about visiting the dentist. | 41 | 26 | 34 | 4.55* |
| 2. | My gums tend to bleed when I brush my teeth. ^(D) | 24 | 21 | 22 | 0.24 |
| 3. | I worry about the color of my teeth. | 86 | 86 | 86 | 0.00 |
| 4. | I have noticed some white sticky deposits on my teeth. | 32 | 21 | 26 | 2.68 |
| 5. | I use a child sized toothbrush. | 16 | 24 | 20 | 1.76 |
| 6. | I think that I cannot help having false teeth when I am old. ^(D) | 55 | 45 | 50 | 1.97 |
| 7. | I am bothered by the color of my gums. | 41 | 35 | 38 | 0.73 |
| 8. | I think my teeth are getting worse despite my daily brushing. ^(D) | 30 | 32 | 31 | 0.04 |
| 9. | I brush each of my teeth carefully. ^(A) | 66 | 76 | 71 | 2.02 |
| 10. | I have never been taught professionally how to brush. ^(D) | 27 | 11 | 19 | 7.75** |
| 11. | I think I can clean my teeth well without using toothpaste. ^(A) | 15 | 15 | 15 | 0.00 |
| 12. | I often check my teeth in a mirror after brushing. ^(A) | 80 | 77 | 79 | 0.34 |
| 13. | I worry about having bad breath. | 83 | 73 | 78 | 2.67 |
| 14. | It is impossible to prevent gum disease with toothbrushing alone. ^(D) | 46 | 59 | 52 | 3.44 |
| 15. | I put off going to the dentist until I have toothache. ^(D) | 49 | 45 | 47 | 0.27 |
| 16. | I have used a dye to see how clean my teeth are. ^(A) | 22 | 21 | 21 | 0.02 |
| 17. | I use a toothbrush which has hard bristles. | 17 | 7 | 12 | 5.04* |
| 18. | I don't feel I've brushed well unless I brush with strong strokes. | 34 | 24 | 29 | 2.02 |
| 19. | I feel I sometimes take too much time to brush my teeth. ^(A) | 39 | 56 | 48 | 5.25* |
| 20. | I have had my dentist tell me that I brush very well. | 45 | 44 | 44 | 0.01 |

Chi-square tests were done between genders. (Significance: *: $P < 0.05$, **: $P < 0.01$, ***: $P < 0.001$)

In the calculation of the HU-DBI: ^(A) = One point is given for each of these agree responses. ^(D) = One point is given for each of these disagree responses.

higher percentage of DT/DH students brushed with "strong strokes" (Item 18) than did dental students ($P < 0.05$), and a higher percentage of DT/DH students were bothered by the color of their gums ($P < 0.05$). A higher percentage of final year students thought that they were able to clean

their teeth well without using toothpaste compared to semi-final ones ($P < 0.01$). Of considerable importance was a finding that a higher percentage of final year students reported a perception of the inevitability of having false teeth ($P < 0.05$). A higher percentage of final year students

Table 3 Percentage of 'agree' response by course and level of education

| No. | Item descriptions | Education | Level | | χ^2 value (<i>P</i>) | |
|-----|--|-----------|--------|------------|-----------------------------|--------|
| | | | Course | Semi-final | Final | Course |
| 1. | I don't worry much about visiting the dentist. | Dentistry | 27 | 27 | 5.72* | 3.93* |
| | | DT & DH | 31 | 52 | | |
| 2. | My gums tend to bleed when I brush my teeth. ^(D) | Dentistry | 13 | 10 | 14.2*** | 0.12 |
| | | DT & DH | 41 | 33 | | |
| 3. | I worry about the color of my teeth. | Dentistry | 89 | 73 | 0.21 | 0.90 |
| | | DT & DH | 84 | 89 | | |
| 4. | I have noticed some white sticky deposits on my teeth. | Dentistry | 27 | 13 | 1.45 | 0.44 |
| | | DT & DH | 31 | 30 | | |
| 5. | I use a child sized toothbrush. | Dentistry | 20 | 17 | 0.21 | 0.26 |
| | | DT & DH | 25 | 20 | | |
| 6. | I think that I cannot help having false teeth when I am old. ^(D) | Dentistry | 44 | 77 | 0.92 | 5.47* |
| | | DT & DH | 41 | 50 | | |
| 7. | I am bothered by the color of my gums. | Dentistry | 33 | 27 | 4.86* | 1.47 |
| | | DT & DH | 38 | 54 | | |
| 8. | I think my teeth are getting worse despite my daily brushing. ^(D) | Dentistry | 27 | 37 | 0.30 | 0.01 |
| | | DT & DH | 41 | 28 | | |
| 9. | I brush each of my teeth carefully. ^(A) | Dentistry | 65 | 83 | 0.04 | 2.75 |
| | | DT & DH | 69 | 74 | | |
| 10. | I have never been taught professionally how to brush. ^(D) | Dentistry | 13 | 10 | 7.25** | 2.90 |
| | | DT & DH | 19 | 35 | | |
| 11. | I think I can clean my teeth well without using toothpaste. ^(A) | Dentistry | 3 | 17 | 14.2*** | 7.05** |
| | | DT & DH | 25 | 28 | | |
| 12. | I often check my teeth in a mirror after brushing. ^(A) | Dentistry | 72 | 90 | 0.35 | 2.36 |
| | | DT & DH | 81 | 80 | | |
| 13. | I worry about having bad breath. | Dentistry | 85 | 73 | 2.63 | 4.62* |
| | | DT & DH | 78 | 67 | | |
| 14. | It is impossible to prevent gum disease with toothbrushing alone. ^(D) | Dentistry | 52 | 40 | 1.49 | 0.74 |
| | | DT & DH | 63 | 54 | | |
| 15. | I put off going to the dentist until I have toothache. ^(D) | Dentistry | 47 | 33 | 1.69 | 0.05 |
| | | DT & DH | 50 | 54 | | |
| 16. | I have used a dye to see how clean my teeth are. ^(A) | Dentistry | 16 | 23 | 1.52 | 0.44 |
| | | DT & DH | 28 | 24 | | |
| 17. | I use a toothbrush which has hard bristles. | Dentistry | 11 | 20 | 0.40 | 1.74 |
| | | DT & DH | 6 | 13 | | |
| 18. | I don't feel I've brushed well unless I brush with strong strokes. | Dentistry | 24 | 17 | 5.96* | 0.98 |
| | | DT & DH | 31 | 43 | | |
| 19. | I feel I sometimes take too much time to brush my teeth. ^(A) | Dentistry | 40 | 47 | 3.14 | 0.74 |
| | | DT & DH | 56 | 54 | | |
| 20. | I have had my dentist tell me that I brush very well. | Dentistry | 37 | 60 | 0.02 | 2.62 |
| | | DT & DH | 44 | 46 | | |

Chi-square tests were done between schools and between levels of dental education. (Significance: *, $P < 0.05$, **, $P < 0.01$, ***, $P < 0.001$)
 In the calculation of the HU-DBI: ^(A) = One point is given for each of these agree responses. ^(D) = One point given for each of these disagree responses.

worried about visiting the dentist ($P < 0.05$) as well as about having bad breath ($P < 0.05$).

Table 4 presents the estimated coefficient and related statistics from a logistic regression model that predicts group membership. The model contains three variables from the HU-DBI and level of dental education. DT/DH students

and final year dental students were more likely to have a positive answer to the following statements: My gums tend to bleed when I brush my teeth (Item 2), I have never been taught professionally how to brush (Item 10), and I think I can clean my teeth well without toothpaste (Item 11).

Table 4 Logistic regression analysis for kinds of school education

| Variables | B | S.E. | Wald chi-square | df | P | Exp(B) | 95%C.I. |
|--------------------|-------|------|-----------------|----|-------|--------|-----------|
| Step 19 | | | | | | | |
| No. 2 | -1.37 | 0.41 | 10.89 | 1 | 0.001 | 0.25 | 0.11-0.57 |
| No.10 | -0.94 | 0.43 | 4.78 | 1 | 0.029 | 0.39 | 0.17-0.91 |
| No.11 | -1.20 | 0.50 | 5.90 | 1 | 0.015 | 0.30 | 0.11-0.79 |
| Level of education | 1.19 | 0.35 | 11.82 | 1 | 0.001 | 3.29 | 1.67-6.48 |
| (Constant) | 4.34 | 1.49 | 8.49 | 1 | 0.004 | 77.0 | |

Data were available for 183 students.

B: estimated coefficient as the predicted change in log hazard for a unit increase in the predictor.

S.E.: standard error, 95%C.I.: 95% confidence interval for Exp(B).

Backward stepwise elimination with the likelihood-ratio criterion was used to select variables for removal.

Variables entered on step 1: Items No.1-20, Level of education and Gender.

Variable removed at step: 2 = No.8, 3 = No.20, 4 = Gender, 5 = No.5, 6 = No.7, 7 = No.9, 8 = No.4, 9 = No.12, 10 = No.14, 11 = No.15, 12 = No.13, 13 = No.16, 14 = No.17, 15 = No.1, 16 = No.6, 17 = No.18, 18 = No.19, 19 = No.3

Table 5 The observed and predicted group membership

| Course | Predicted dental course | | Percentage Correct |
|-----------|-------------------------|----------|--------------------|
| | Dentistry | DT or DH | |
| Dentistry | 94 | 11 | 89.5 |
| DT or DH | 37 | 41 | 52.6 |
| Total | | | 73.8 |

The cut value is 0.50. Nagelkerke $R^2 = 0.28$.

Table 5 shows that 94 dental students (89.5%) were correctly predicted by the model. However, only 41 DT/DH students (52.6%) were correctly predicted.

The summative estimate of dental health behavior was calculated from the responses to the 20 items in the HU-DBI. Table 6 presents the mean HU-DBI scores for each group; the maximum score possible was 11. The mean HU-DBI score of the final year dental students was the highest (6.53). However, the mean scores between the courses and between the levels were not significantly different.

Discussion

The aim of this study was to compare the dental behavior and attitudes between students of dentistry and students of DT/DH. The null hypothesis was rejected and significant differences were found between specialties as well as between different levels of education within the same

Table 6 Comparison of the HU-DBI scores between courses and levels of education

| Course | Level | Semi-final | Final | t test ¹⁾ |
|-----------|----------------------|-------------|-------------|----------------------|
| Dentistry | | 6.00 ± 1.54 | 6.53 ± 1.48 | NS |
| DT & DH | | 6.06 ± 1.76 | 6.07 ± 1.83 | NS |
| | t test ²⁾ | NS | NS | |

Unpaired t test (NS: Not significant).

1) between levels of education 2) between courses

specialty.

The literature lacks studies about oral health attitudes and behaviors among Jordanian oral health workers and students. This study is of prime importance in this field as it is the first to explore this area among Jordanian university students.

In Jordan there is no emphasis on dental health care during primary, middle and high school education. Knowledge and awareness concerning some oral health subjects (such as periodontal disease) is still poor and more dental health education is needed to improve oral health (11). Taani showed that a high percentage of Jordanian adults reported gum bleeding on brushing, bad breath, and being irregular attenders to the dentist (11). In another study on north Jordan school children he showed that around 80% of the subjects attended the dentist only in an emergency (12).

The above-mentioned findings in the literature might explain why most subjects of our study were worried about bad breath and the colour of their dentition. The same argument may also explain the finding that 47% of the study sample put off going to the dentist until they have toothache. These findings highlight the need to carry out more research on Jordanians' oral health attitudes/behavior as well as to improve their oral health care education systems.

Emphasis on dental health care should be developed and maintained during early education in order to improve the dental health behavior of adults later on.

Students in the dental field should be introduced early to oral health care education, before they come in contact with patients. This is a key factor in developing their dental health attitudes and behaviors in order to allow them to have a positive impact on the dental health attitudes and behaviors of their patients.

Education about dental health care in the pre-university curriculum could be an important factor that can influence the oral health attitudes of students entering the dental field.

Our study found that positive attitudes (such as worrying more about visiting the dentist and worrying more about having bad breath) developed as the level of education increased; this could be the result of receiving more dental health care education as their courses progressed.

One interesting finding was that a higher level of education was associated with more concern about the inevitability of having false teeth. This could be explained by the fact that with increased levels of education, students become more concerned about their dentition and become more aware of the limitations and the impact of the loss of dentition on their dental function and aesthetics.

Other studies have also shown that within the same specialty, dental health attitudes become more positive with increasing age and level of education. Kawamura et al. (10) showed that the dental health attitudes of Japanese dental students improved with increasing levels of education. In a sample of Korean dental hygiene students, Kawamura et al. (6) showed that positive dental health attitudes were related to level of education.

It would be worth comparing dental health attitudes between different specialties in the dental field from different countries. This might cast light on weaknesses in the dental curriculum and could lead to an improvement in the attitudes of dental health workers and thus improve the level of the oral health care that they can provide.

The finding that females had more positive dental attitudes (such as worrying more about visiting the dentist, being more educated about professional tooth brushing, and taking longer to brush their dentition) could be explained on the basis that females usually care more

about their body and appearance. They would thus be more concerned about visiting the dentist and would tend to be more educated about their dentition even before entering a course related to dentistry.

The fact that dental students were found to have more positive dental attitudes and behavior (such as worrying more about visiting the dentist, having less gum bleeding when brushing their dentition, receiving more professional education on tooth brushing, avoiding strong strokes when brushing, thinking less that they are able to brush their teeth well without using toothpaste, and being bothered less by the colour of their gums) than DT/DH students might be explained by the fact that dentistry students are introduced to dental clinics in a more intense way than DT/DH students. Dental students have more prolonged and direct contact with patients during their undergraduate study, and this clinical component of the dental course could be the underlying cause of the variation between different courses. Thus, the variation in dental attitudes and behavior in the study sample reflects the students' clinical training and the curriculum. Other studies have shown that the clinical training and curriculum of dentally related courses have an impact on dental health attitudes and behavior of students (6,10).

References

1. Paik DI, Moon HS, Horowitz AM, Gitt HC, Jeong KL, Suh SS (1994) Knowledge of and practices related to caries prevention among Koreans. *J Public Health Dent* 54, 205-210
2. Andersen R, Marcus M, Mahshigan M (1995) A comparative systems perspective on oral health disease prevention. In *Disease prevention and oral health promotion. Socio-dental sciences in action.* Cohen LK, Gift HC eds. 3rd ed, Munksgaard, Copenhagen 307-340
3. Uitenbroek DG, Schaub RMH, Tromp JAH, Kant JH(1989) Dental hygienists' influence on the patients' knowledge, motivation, self-care, and perception of change. *Community Dent Oral Epidemiol* 17, 87-90
4. Abraham NJ, Cirincione UK, Glass RT (1990) Dentists' and dental hygienists' attitudes toward toothbrush replacement and maintenance. *Clin Prev Dent* 12, 28-33
5. Brown LF (1996) A comparison of patients attending general dental practices employing or not employing dental hygienists. *Aust Dent J* 41, 47-52
6. Kawamura M, Spadafora A, Kim KJ, Komabayashi T (2002) Comparison of United States and Korean dental hygiene students using the Hiroshima

- university-dental behavioral inventory (HU-DBI). *Int Dent J* 52, 156-162
7. Kawamura M (1998) Dental behavioral science: The relationship between perceptions of oral health and oral status in adults. *J Hiroshima Univ Dent Soc* 20, 273-286 (in Japanese)
 8. Kawabata K, Kawamura M, Miyagi M, Aoyama H, Iwamoto Y (1990) The dental health behavior of university students and test-retest reliability of the HU-DBI. *J Dent Health* 40, 474-475 (in Japanese)
 9. Kawamura M, Kawabata K, Sasahara H, Fukuda S, Iwamoto Y. (1992) Dental behavioral science Part IX. Bilinguals' responses to the dental behavioral inventory (HU-DBI) written in English and in Japanese. *J Hiroshima Univ Dent Soc* 22, 185-199 (in Japanese)
 10. Kawamura M, Iwamoto Y, Wright FAC (1997) A comparison of self-reported dental health attitudes and behavior between selected Japanese and Australian students. *J Dent Educ* 61, 354-360
 11. Taani DQ (2002) Periodontal awareness and knowledge, and pattern of dental attendance among adults in Jordan. *Int Dent J* 52, 94-98
 12. Taani DQ (2002) Dental attendance and anxiety among public and private school children in Jordan. *Int Dent J* 52, 25-29
 13. Kawamura M, Honkala E, Widström E, Komabayashi T (2000) Cross-cultural differences of self-reported oral health behaviour in Japanese and Finnish dental students. *Int Dent J* 50, 46-50